the coast stations, during the Gulf storms, the reports have shown quiet airs in general. The motion of cirrus has been remarkably uniform from west to east, except on the coasts. This has been due to the moderate character of the lows or to their lack of intensity, their influence rarely extending as high as cirrus.

LOCAL STORMS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

There were very few severe local storms during the month. Two West India hurricanes crossed the Gulf and South Atlantic coasts, causing dangerous winds and destructive tides at a few points. The most serious disasters occurred on the Texas Coast about 7:30 p. m. of the 13th. Thirteen lives were lost and property to the value of $150,000 was destroyed, the destruction being due to the combined forces of high winds and tides.

One low area storm moved from the upper Missouri Valley on the 14th to the Atlantic Coast, reaching the latter on the 17th. This disturbance was accompanied by severe thunder storms throughout the Missouri Valley, the Lake Region, and the Ohio Valley.

A West India hurricane passed northeastward across the Peninsula of Florida on the 20th, thence along the Atlantic Coast, finally disappearing south of New England on the 24th. The winds were not unusually dangerous, although considerable damage was done to exposed property on the beach. Reports from vessels that encountered the storm indicate that its center was several hundred miles east of the coast line.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The temperature was below normal on the Pacific Coast and in Florida, and there were also slight deficiencies in New Jersey, New York, and generally throughout New England. Elsewhere the month was unusually warm, especially so in the States of Iowa, Illinois, Missouri, Kansas, Nebraska, North Dakota, South Dakota, and Minnesota. In this large region the DAILY excesses of temperature exceeded 5° on the average of the month. Maximum temperatures, ranging from 90° to 100°, prevailed almost continuously from the 1st to the 16th. Prostrations, and in a few cases deaths, due to the extreme heat occurred in Chicago on the 9th, 10th, 11th, 13th, 14th, and 15th. The unusual heat was coupled with clear skies, southwesterly winds, and a low degree of humidity, conditions which are not especially hurtful to the human organism, however injurious they may be to vegetable life. Cool nights in many localities greatly lessened the discomfort of the heat. Serious bodily discomfort is rarely experienced except when the minimum temperature, or the temperature of nighttime, does not fall below 75°. It will be noticed that in the majority of cases in the table following that the temperature of nighttime fell to or below 75°; also, that the temperature of evaporation and the relative humidity were low, except in a few cases. No prostrations by heat were reported from the harvest fields or in the smaller towns and cities.

On the 14th an area of cloud and rain formed in Kansas and Nebraska and passed eastward, reaching the Atlantic Coast on the 17th, bringing relief from the unseasonable temperatures that had prevailed since the first of the month. The temperature rose after the passage of the storm, and the month closed with temperatures generally above the normal.

The mean temperatures and the departures from the normal, as determined from records of the maximum and minimum thermometers, are given in Table I for the regular stations of the Weather Bureau, which also gives the height of the thermometers above the ground at each station. The mean temperature is given for each station in Table II, for voluntary observers.

Climatic statistics during the continuance of the hot weather.

CHICAGO, ILL.

September, 1897.	Max. temp.	Min. temp.	Wet thermometer. 8 a.m.	Wet thermometer. 8 p.m.	Relative humidity. 8 a.m.	Relative humidity. 8 p.m.	Daily wind movement.
	°	°	°	°	%	%	*Miles.*
1	71	65	60	67	60	86	344
2	69	64	63	65	88	85	397
3	71	66	63	66	78	81	401
4	76	62	58	68	65	75	405
5	85	64	59	67	66	40	383
6	85	71	61	68	52	66	344
7	84	68	60	66	52	53	361
8	92	74	62	70	45	41	389
9	94	73	63	66	48	32	362
10	94	70	63	68	52	54	361
11	73	67	68	68	90	93	389
12	86	70	69	73	82	77	223
13	82	72	63	70	54	86	308
14	91	72	71	70	86	44	258
15	91	74	67	77	64	64	491
16	81	64	70	62	83	66	361
Mean	83	68	64	68	66	65	361

BISMARCK, N. DAK.

1	74	54	53	66	87	65	224
2	96	62	64	69	89	33	306
3	100	75	64	65	50	24	422
4	84	61	58	60	74	29	210
5	87	54	48	62	43	30	260
6	90	60	57	68	79	43	312
7	102	58	57	64	86	18	154
8	100	62	60	65	42	52	363
9	67	49	46	53	79	42	273
10	63	48	45	54	79	55	108
11	86	56	54	67	80	43	231
12	78	55	57	58	87	41	141
13	83	56	50	70	65	67	255
14	84	61	62	57	78	32	276
15	63	43	43	43	86	90	241
16	58	32	31	46	85	58	157
Mean	82	55	53	60	74	45	251

OMAHA, NEBR.

1	99	74	67	72	70	36	216
2	97	73	68	70	78	39	178
3	94	71	66	69	73	38	272
4	96	70	64	69	61	34	258
5	98	78	68	70	50	38	240
6	92	71	64	67	66	38	227
7	92	69	64	70	70	40	248
8	90	72	66	69	69	39	277
9	92	72	66	70	73	44	195
10	84	61	58	72	79	78	108
11	86	67	67	74	92	63	125
12	93	73	69	72	84	48	122
13	93	72	65	69	67	38	142
14	86	72	67	70	70	54	232
15	86	68	68	74	95	72	109
16	76	50	49	50	76	44	338
Mean	91	69	65	69	73	46	205

ST. LOUIS, MO.

1	96	75	70	73	78	42	161
2	94	75	68	74	65	48	166
3	93	72	68	73	75	54	194
4	91	67	63	67	70	36	160
5	93	70	64	67	70	34	153
6	93	68	67	68	83	35	126
7	95	71	62	72	48	41	151
8	95	74	69	68	67	32	156
9	96	74	66	68	60	33	164
10	96	75	66	70	62	36	154
11	95	77	69	73	65	54	140
12	98	74	68	67	64	27	88
13	95	74	66	73	57	49	146
14	96	73	69	72	74	44	180
15	98	75	70	73	74	42	208
16	91	69	71	70	63	84	269
Mean	95	73	67	70	66	43	164

The *monthly mean temperatures* published in Table I, for the regular stations of the Weather Bureau, are the simple means of all the daily maxima and minima; for voluntary

stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II. The mean temperatures given in Table III for Canadian stations are the simple means of 8 a. m. and 8 p. m. simultaneous observations.

The *regular diurnal period* in temperature is shown by the hourly means given in Table V for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution of the observed monthly mean* temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart IV; the lines are drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

Considered by districts the mean temperatures of the current month show departures from the normal as given in Table I. The greatest positive departures were: North Dakota, 9.5; upper Mississippi, 7.9; Missouri Valley, 9.0. The greatest negative departures were: Florida Peninsula, 1.8; north Pacific, 0.8.

In Canada, Prof. R. F. Stupart says:

> The mean temperature of the month exceeded the average by 8° to 10° in Manitoba, and thence both westward and eastward the excess diminished. Alberta showed an excess of from 2° to 4°, and near the British Columbia Coast the mean was very nearly average. Eastward, Thunder Bay, Algoma, and Nipissing districts and counties near Lake Huron showed an excess of from 3° to 5°; near Lake Ontario and along the upper St. Lawrence the temperature was just average, and in Quebec and the Maritime Provinces ranged from average to about 2° below.

Accumulated monthly departures from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column, for comparison with the departures of current conditions of vegetation from the normal condition.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
	°	°		°	°
New England	+ 3.9	+ 0.4	Southern Slope	0.0	0.0
Middle Atlantic	+ 1.6	+ 0.2	Florida Peninsula	— 1.8	— 0.2
South Atlantic	+ 1.3	+ 0.1	Southern Plateau	— 5.2	— 0.6
East Gulf	+ 2.9	+ 0.3	Middle Plateau	— 5.7	— 0.6
West Gulf	+ 9.0	+ 1.0	Middle Pacific	— 2.8	— 0.3
Ohio Valley and Tenn.	+ 2.9	+ 0.3	South Pacific	— 4.9	— 0.5
Lower Lake	+ 4.9	+ 0.5			
Upper Lake	+14.7	+ 1.6			
North Dakota	+ 3.7	+ 0.4			
Upper Mississippi Valley	+ 9.6	+ 1.1			
Missouri Valley	+ 9.8	+ 1.1			
Northern Slope	+ 3.0	+ 0.3			
Middle Slope	+ 8.6	+ 1.0			
Northern Plateau	+ 8.3	+ 0.9			
North Pacific	+ 0.4	0.0			

The *years of highest and lowest mean temperatures* for September are shown in Table I of the REVIEW for September, 1894. The mean temperature for the current month was the highest on record at: Memphis, 78.0; Marquette, 63.2; Chicago, 69.5; Milwaukee, 67.3; Green Bay, 66.0; Duluth, 62.6; Moorhead, 65.6; Bismarck, 67.1; Williston, 64.0; Minneapolis, 68.8; St. Paul, 67.6; La Crosse, 68.0; Davenport, 72.2; Des Moines, 73.7; Dubuque, 69.9; Keokuk, 74.4; Cairo, 75.8; Springfield, Ill., 73.2; Hannibal, 73.4; St. Louis, 77.4; Columbia, Mo., 75.8; Kansas City, 76.8; Springfield, Mo., 75.8; Topeka, 75.4; Omaha, 75.2; Sioux City, 71.8; Pierre, 71.7; Huron, 69.4; Yankton, 72.7; Rapid City, 68.8; Cheyenne, 61.8; North Platte, 70.8; Denver, 66.4; Concordia, 75.3; Dodge City, 73.2; Wichita, 75.2.

The *years of highest maximum and lowest minimum temperatures* for September are given in the last four columns of Table I of the REVIEW for September, 1896. During the current month the maxima temperatures were equal to or above the highest on record at: Eastport, 89; Portland, Me., 94; Northfield, 90; Woods Hole, 85; Block Island, 86; Narragansett Pier, 90; Harrisburg, 95; Atlantic City, 94; Lynchburg, 99; Raleigh, 98; Pensacola, 94; Louisville, 100; Indianapolis, 96; Cincinnati, 97; Parkersburg, 99; Sandusky, 96; Toledo, 95; Alpena, 94; Grand Haven, 92; Port Huron, 95; Sault Ste. Marie, 91; Milwaukee, 95; Bismarck, 102; Des Moines, 98; Hannibal, 98; Eureka, 82; Point Reyes Light, 92. The minimum temperatures were the lowest on record at: Savannah, 46; Key West, 69.

FROST.

Frost was observed as follows: Alabama, light on the 22d at Florence and Riverton. Arkansas, light frost generally on the 21st, 22d, and 23d; killing on the 21st at Keesees Ferry and Silver Springs. Colorado, light frosts occurred on the 1st, 9th, 10th, 14th, and 15th, and on other dates; killing on the 16th, 17th, 18th, and other dates. Florida, light on the 21st at Chipley, Orange Hill, and Vernon, Washington County; a very unusual occurrence. Georgia, light on the 24th and 30th at Diamond, Ramsey, and Clayton. Idaho, killing on the 3d, and on subsequent dates. Illinois, killing frost at Danville on the 20th. Indiana, killing on the 19th, and on subsequent dates. Iowa, 20th, heavy to killing frosts generally in northern portion and light to heavy in southern portion. Kansas, light frosts occurred on the 17th in Johnson County, on the 18th in Johnson and Franklin, and on the 20th and 21st in Johnson, Franklin, Marshall, Coffey, Greenwood, Wilson, Neosho, and Cherokee. Kentucky, killing at a number of places on the 21st and 22d. Maryland, killing at a few places on the 21st and 22d, also on the 26th. Minnesota, heavy frost general on the mornings of the 17th and 20th; in the southern portion of the State hardy vegetation escaped injury. Mississippi, at Pontotoc killing frost was observed on the lowlands on the 21st. Missouri, killing frost at some stations on the 20th, 21st, and 22d. Nebraska, no killing frost was observed. New England, in the northern portion general killing frost was reported on the 22d; in southern sections the frost of the 28th was commonly reported as killing. New Jersey, one station reported killing frost on the 22d and two on the 28th. New Mexico, no destructive frosts. North Carolina, killing frosts at Biltmore, 30th; Linville, 21st, 29th, and 30th; Waynesville, 30th. Oklahoma, no killing frosts were observed. Ohio, killing frosts on 18th, 20th, 21st, 22d, and other dates. South Dakota, killing frosts on the 15th, 16th, and 17th. Tennessee, general frosts on the 21st, 22d, and 23d; some damage was done to tobacco and tender vegetation. Virginia, killing frosts at elevated stations on the 21st, 22d, 29th, and 30th. West Virgina, killing frosts on the 20th, 22d, and other dates; damage slight. Wisconsin, killing frost on the 20th.

MOISTURE.

The *quantity of moisture* in the atmosphere at any time may be expressed by the weight of the vapor coexisting with the air contained in a cubic foot of space, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-point for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, is given in Table I.

The *rate of evaporation* from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer. The mean wet-bulb temperature is now published in Table I; it is always intermediate, and generally about half way between the temperature of the air